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What is claimed is:

1. A method for separating a polymer from a solvent, comprising:

introducing a superheated polymer-solvent mixture to an extruder, wherein the extruder comprises an upstream vent and a downstream vent;

removing solvent from the superheated polymer-solvent mixture via the upstream vent and the downstream vent; and

isolating a polymer product from the superheated polymer-solvent mixture;

wherein the polymer-solvent mixture comprises a polymer and a solvent, wherein the amount of polymer in the polymer-solvent mixture is less than or equal to about 75 weight percent based on the total weight of polymer and solvent.

2. The method of claim 1, wherein the polymer is a polyetherimide, a polycarbonate, a polyamide, a polyarylate, a polyester, a polysulfone, a polyetherketone, a polyimide, an olefin polymer, a polysiloxane, a poly(alkenyl aromatic), a liquid crystalline polymer, or a combination comprising at least one of the foregoing polymers.

3. The method of claim 1, wherein the upstream vent is operated at about 750 mm of Hg or greater or about 750 mm of Hg or less, and wherein the downstream vent is operated at about 750 mm of Hg or less.

4. The method of claim 1, wherein about 50 to about 99 percent of the solvent present in the superheated polymer-solvent mixture is removed through the upstream vent.

5. The method of claim 4, wherein about 1 to about 50 percent of the solvent present in the superheated polymer-solvent mixture is removed through the downstream vent.

6. The method of claim 1, wherein the superheated polymer-solvent mixture is pressurized.

7. The method of claim 6, wherein the superheated polymer-solvent mixture has a temperature about 2°C to about 200°C higher than the boiling point of the solvent at atmospheric pressure.

8. The method of claim 1, wherein the extruder further comprises a side feeder, wherein the side feeder comprises a side feeder vent operated at about 750 mm of Hg or greater or about 750 mm of Hg or less.

9. The method of claim 8, wherein the polymer-solvent mixture is introduced into the side feeder via a pressure control valve connected to the side feeder.

10. The method of claim 8, wherein the side feeder further comprises a kneading block, wherein the pressure control valve is positioned between the extruder and the kneading block and the kneading block is positioned between the pressure control valve and the side feeder vent.

11. The method of claim 1, wherein the extruder further comprises a non-venting side feeder.

12. The method of claim 11, further comprising introducing a filler, additive, or additional polymer to the extruder via the non-venting side feeder.

13. The method of claim 1, wherein the heated polymer-solvent mixture is introduced to the extruder via a feed inlet in fluid communication with the extruder barrel.

14. The method of claim 13, wherein the feed inlet is a pressure control valve.

15. The method of claim 14, wherein a cracking pressure of the pressure control valve is about 0.07 kgf/cm^2 to about 25 kgf/cm^2.

16. The method of claim 13, wherein the upstream vent is positioned upstream from the feed inlet.

17. The method of claim 1, wherein the polymer product is substantially free of solvent.

18. The method of claim 1, wherein the extruder is a twin-screw counter-rotating extruder, a twin-screw co-rotating extruder, a single-screw extruder, or a single-screw reciprocating extruder.

19. The method of claim 1, wherein the extruder is operated at a temperature of about 200 to about 400 degrees centigrade.

20. The method of claim 1, wherein the extruder operation is characterized by a ratio of a feed rate in kilograms per hour to an extruder screw speed in revolutions per minute, the ratio being about 0.0045 to about 45.

21. The method of claim 1, further comprising introducing the polymer product into a second extruder.

22. The method of claim 21, wherein the second extruder is a twin-screw counter-rotating extruder, a twin-screw co-rotating extruder, a single-screw extruder, or a single-screw reciprocating extruder.

23. The method of claim 21, wherein the second extruder comprises a second extruder vent operated at about 750 mm of Hg or less.

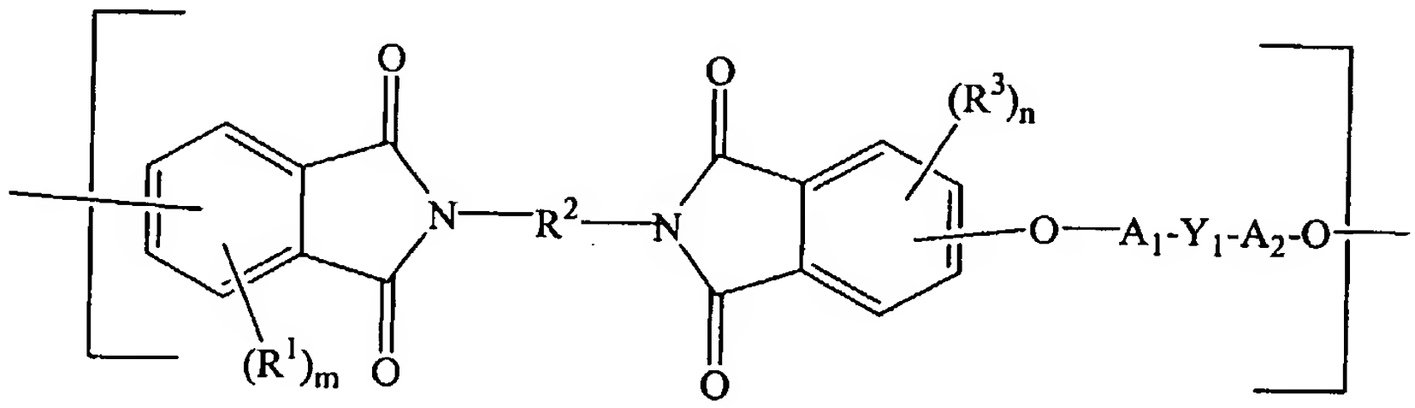
24. The method of claim 1, wherein the superheated polymer-solvent mixture is heated by a heat exchanger or an extruder.

25. The method of claim 1, wherein the polymer-solvent mixture before entering the extruder has a polymer content of about 5 to about 60 percent by weight based on the total weight of polymer and solvent.

26. The method of claim 1, wherein the solvent is a halogenated aromatic solvent, a halogenated aliphatic solvent, a non-halogenated aromatic solvent, a non-halogenated aliphatic solvent, or a mixture thereof.

27. The method of claim 1, further comprising introducing nitrogen gas into the extruder.

28. The method of claim 1, wherein the polymer-solvent mixture comprises a polyetherimide having structure I



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wherein R^1 and R^3 are independently at each occurrence halogen, C_1-C_{20} alkyl, C_6-C_{20} aryl, C_7-C_{21} aralkyl, or C_5-C_{20} cycloalkyl;

R^2 is C_2-C_{20} alkylene, C_4-C_{20} arylene, C_5-C_{20} aralkylene, or C_5-C_{20} cycloalkylene;

A^1 and A^2 are each independently a monocyclic divalent aryl radical, Y^1 is a bridging radical in which one or two carbon atoms separate A^1 and A^2; and m and n are independently integers from 0 to 3.

29. The method of claim 28, wherein the polymer-solvent mixture further comprises a polycarbonate ester, a poly(arylene ether), a liquid crystal polymer, or a combination comprising at least one of the foregoing polymers.

30. The method of claim 1, wherein solvent present in the superheated polymer-solvent mixture is removed through the upstream vent and the downstream vent to provide a polymer product containing less than about 1000 parts per million solvent.

31. A method for separating a polymer from a solvent, comprising:

introducing a superheated polymer-solvent mixture via a pressure control valve located on an extruder, wherein the extruder comprises an upstream vent, a downstream vent, and a side feeder, wherein the side feeder comprises a side feeder vent;

removing solvent from the superheated polymer-solvent mixture via the upstream vent, the downstream vent, and the side feeder vent; and

isolating a polymer product from the polymer solvent mixture;

wherein the polymer-solvent mixture comprises a polymer and a solvent, and wherein the polymer comprises a polyetherimide.

32. A system for separating a polymer from a solvent, comprising:

a means for superheating a polymer-solvent mixture; and

an extruder in communication with the means for superheating the polymer solvent mixture, wherein the extruder comprises an upstream vent and a downstream vent.

33. The system of claim 32, wherein the upstream vent is operated at about 750 mm of Hg or greater or about 750 mm of Hg or less, and wherein the downstream vent is operated at about 750 mm of Hg or less.

34. The system of claim 32, wherein the extruder further comprises a side feeder in communication with the extruder, wherein the side feeder comprises a side feeder vent.

35. The system of claim 34, wherein the side feeder vent is operated at about 750 mm of Hg or greater or about 750 mm of Hg or less.

36. The system of claim 34, wherein the side feeder comprises a pressure control valve through which the polymer-solvent mixture may be introduced into the extruder via the side feeder.

37. The system of claim 34, wherein the side feeder further comprises a kneading block, wherein the pressure control valve is positioned between the extruder and the kneading block and the kneading block is positioned between the pressure control valve and the side feeder vent.

38. The system of claim 34, wherein the side feeder is a twin-screw side feeder having a length to diameter ratio of 20 or less.

39. The system of claim 34, further comprising a condensing means in communication with the upstream vent and downstream vent.

40. The system of claim 32, wherein the extruder is a twin-screw counter-rotating extruder, a twin-screw co-rotating extruder, a single-screw extruder, or a single-screw reciprocating extruder.

41. The system of claim 32, wherein the extruder has a length to diameter ratio of about 30 to about 60.

42. The system of claim 32, wherein the extruder comprises a pressure control valve through which the polymer-solvent mixture may be introduced into the extruder.

43. The system of claim 32, further comprising a filtration system in communication with the extruder.

44. The system of claim 32, further comprising a concentrating means in communication with the extruder.

45. The system of claim 32, further comprising a heating means to superheat the polymer-solvent mixture.

46. The system of claim 32, wherein the system is connected to a second extruder.

47. A method of preparing a filled polymer, comprising:

introducing a superheated polymer-solvent mixture to an extruder, wherein the extruder comprises an upstream vent and a downstream vent, and wherein the polymer-solvent mixture comprises a filler;

removing solvent from the superheated polymer-solvent mixture via the upstream vent and the downstream vent to form a filled polymer.

48. The method of claim 47, wherein the filler is fumed or fused silica; crystalline silica; talc; glass fibers; carbon black; conductive fillers; carbon nanotubes; nanoclays; organoclays; or a combination comprising at least one of the foregoing fillers.

49. The method of claim 47, wherein the polymer is polyetherimide, polycarbonate, poly(arylene ether), polyamide, polyarylate, polyester, polysulfone, polyetherketone, polyimide, olefin polymer, polysiloxane, poly(alkenyl aromatic), liquid crystalline polymer, or a combination comprising at least one of the foregoing polymer.

50. The method of claim 47, wherein the extruder further comprises a side feeder, wherein the side feeder comprises a side feeder vent operated at about 750 mm of Hg or greater or about 750 mm of Hg or less, and wherein the side feeder further comprises a kneading block.